UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH ADMINISTRATION
BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE
DIVISION OF TRUCK CROP AND GARDEN INSECT INVESTIGATIONS

MEMORANDUM OF INFORMATION ON INSECTICIDES USED FOR THE CONTROL OF LYGUS PLANT BUGS AFFECTING SUGAR BEETS GROWN FOR SEED

The principal purpose of this memorandum is to give to the growers of sugar beet seed and other interested persons a brief summary of the results obtained in experiments on the control of Lygus plant bugs on this crop during the seasons of 1941 and 1942. These experiments were performed by the workers of this Bureau at the Phoenix, Ariz., field laboratory.

A previous report[1] on this work, issued in October 1941, gave an account of field studies up to the close of 1940, which showed that the presence of certain species of Lygus bugs on sugar beet seed plants in the field was associated with the production of nongerminating seed on such plants. This report also showed that, on the basis of preliminary tests, the application of certain insecticides, especially dust mixtures containing pyrethrum or sulfur, reduced the number of Lygus bugs on the treated plants and led to an increase in the percentage of germinating seed produced.

Results of tests with insecticides during 1941 were not outstanding, owing to the relatively low Lygus populations in the sugar beet seed fields located in the Salt River Valley. In 1942 the Lygus populations in the Valley were the highest since 1939, when studies on this problem were begun, and an excellent opportunity was afforded to test the value of various insecticides in controlling these pests.

During 1942 seven insecticides were tested in experimental plots. Each plot was 1/58 acre in size, and eight plots were treated with each insecticide. Applications of the insecticides were made with hand dusters from a movable scaffold above the plants to simulate application by airplane. This method is described and illustrated in the report mentioned in a preceding paragraph. Five applications of each dust were made at weekly intervals during the month of May, at rates ranging from 72 to 100 pounds per acre for each application. It is believed that excessively large quantities of the materials were applied, but this was done purposely, under conditions of the experiment, for three reasons: (1) to be certain that all the plants were covered thoroughly by the insecticides, (2) to determine the relative value of each insecticide in reducing the number of Lygus bugs present, and (3) to determine definitely whether any burning or other detrimental effect on the plants would be caused by the insecticides when apparently excessive quantities were applied. The results of these tests, expressed in percentages of germinating (viable) seed, are given in the accompanying table.

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[1] Hills, O. A., and Romney, Van E. A progress report on investigations of insects affecting sugar beets grown for seed in Arizona and New Mexico. U. S. Bur. Ent. and Plant Quar. E-552, 13 pp., illus. 1941. (Processed.) (A few of these circulars are still available for distribution.)

Germination of sugar beet seed on plants in experimental plots that received insecticidal treatments for the control of Lygus plant bugs. Phoenix, Ariz., 1942

Treatment	Percentage of germinating seed 1/
1. Pyrethrin and sulfur dust (0.2 percent pyrethrins and 50 percent sulfur) - - - - - - - - - - - - Proprietary preparation consisting of 1 part of a material coated with an oil solution of the active principles of pyrethrum, 5 parts of dusting sulfur, and 4 parts of pyrophyllite or talc, by weight	90.1
2. Pyrethrin dust (0.2 percent pyrethrins) - Same as treatment 1 except that pyrophyllite or talc was substituted for sulfur	89.3
3. Sulfur dust (approximately 325 mesh)- Proprietary preparation consisting of 94 parts of sulfur and 6 parts of conditioner, by weight	84.8
4. Phthalonitrile and sulfur dust - Consists of 1 part of phthalonitrile and 6½ parts of dusting sulfur, by weight - - - -	84.7
5. Dinitro-o-cyclohexylphenol and sulfur dust - Proprietary preparation consisting of 1 part of dinitro-o-cyclohexylphenol, 50 parts of dusting sulfur, and 49 parts of a special volcanic ash mixed with walnut shell flour, by weight	84.0
6. Paris green and sulfur dust - Consists of 7½ parts of paris green and 92½ parts of dusting sulfur, by weight	83.7
7. Dinitro-o-cyclohexylphenol dust - Same as treatment 5 except that volcanic ash-walnut shell flour was substituted for sulfur	75.1
8. Untreated check -	61.1

1/ Figures for each treatment are based on an average from 8 replicate plots.

The results of these experiments show that in the seven treatments the highest percentage of germinating sugar beet seed was produced in the plots where the dust mixture containing pyrethrins and sulfur, or the pyrethrin dust mixture alone, was used. Slightly inferior results were obtained by the use of dusting sulfur alone, phthalonitrile and sulfur, dinitro-o-cyclohexylphenol and sulfur, or paris green and sulfur. Results with the dinitro-o-cyclohexylphenol dust alone were markedly inferior. Examinations of the plots at regular intervals midway between the five applications of insecticides showed that the two dust mixtures containing pyrethrins and the sulfur dust alone were the most effective in reducing the number of Lygus bugs on the plots. None of these insecticides had any detrimental effect on the plants.

Although the highest percentage of germinating sugar beet seed was produced on the plots where the two dust mixtures containing pyrethrins were applied and these two mixtures were also highly effective in reducing the numbers of Lygus bugs, the sulfur dust alone may be very useful if pyrethrum is unavailable.

There are several types of sulfur on the market that may be used for dusting as an insecticide. As yet there has not been an opportunity to test their relative merits for the control of Lygus on sugar beets grown for seed, but such experiments are planned for the future. The manufacturer of the sulfur dusts used in these experiments guaranteed that "95 percent of the sulfur content, by weight, will pass through a 325-mesh screen, and 35 percent of the particles, by number, measure less than 1 micron in size."

It is recognized that conditions surrounding experiments of the kind discussed in this memorandum are different from those which prevail under the field conditions faced by the grower. It is planned, therefore, to conduct large-scale field-plot experiments for Lygus control in 1943, using the insecticides discussed in this memorandum or similar ones. These large-scale experiments should be made to determine more definitely the time of application, the number of applications, and the quantity of insecticides applied.

Although the most practical method of application has not been determined, the information given in this memorandum should be of value to the growers who are planning to use insecticides for the control of Lygus on sugar beets grown for seed in 1943. Both airplanes and ground machines have been used on commercial plantings. The airplane has a distinct advantage over the ground machine because it does not break down the seed stalks.

Orin A. Hills
U. S. Department of Agriculture
Route 6, Box 708
Phoenix, Ariz.

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